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CZECHOSLOVAK ECONOMIES IN NONFERROUS METALS

Czechoslovak industry will fulfill the increased assignments of the revised Five-Year Plan, in spite of the necessity of curtailing the use of nonferrous metals. These will be supplemented by production of glass, ceramics, suitable plastics and other materials, freely machining steel, and, in certain cases, plated semifinished goods (products to whose bases of steel or other material a layer of nonferrous metal is applied). This can be done on one or both sides by hot rolling, for example; the resulting layer of copper, brass, bronze, or aluminum, in varying thicknesses, is inseparably fused.

Sheets and Strips

1. Steel sheets and strips, plated on one or both sides with copper or brass.

The over-all thickness of the plating metal is 5, 10, or at the most 15 percent of the total thickness of the finished plated article. Thus, the composition of a sheet one millimeter thick, plated on both sides with copper, will be approximately 5:90:5 (Cu 0.05 : Fe 0.90 : Cu 0.05 percent), 10:80:10, or, as a maximum, 15:70:15. In the case of a single-side plating, the same ratios will hold true, i.e., approximately 95.5, 90:10, or 85:15 percent.

Standard cold-rolled semifinished plated goods are produced in thicknesses from 0.2 to approximately 3 millimeters and with a maximum area of 800 x 2,000 millimeters; they may be soft, semihard, or hard. Greater thicknesses are produced only to special specifications. The base for most plating consists of malleable steel sheets, whose quality corresponds to CSN (Ceskoslovenske Normy, Czechoslovak Norms) No 1164-1941.

Steel sheets plated on one side (95:5) or on both sides (5:90:5) with copper or brass have the following mechanical properties:

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Type	Yield Point (kg per sq mm)	Tensile Strength (kg per sq mm)	Elongation (%)
Soft	25	32	30
Semihard	30	40	5
Hard	40	50	2

2. Steel strips plated on one or both sides with bronze, Cu-Sn 6 or Cu-Sn 8.

Material treated in this manner is to be marked either Fe-CuSn 6 pl or Fe-CuSn 8 pl. These semifinished goods, which have extremely good sliding properties, are considered for production of ball-bearing housings and for manufacturing various parts in machine construction and instrument making in the electrical industry. The individual technical conditions for the production of these special plate jobs must be negotiated independently for each primary delivery.

3. Steel strips plated with aluminum.

So far, only strips 0.15 to 0.5 millimeter thick, with a maximum width of 160 millimeters, are being produced. These are plated with aluminum on one or both sides, and the thickness of the plate varies from 5 to 10 percent of the over-all thickness of the strip. They are produced in the soft type with Al-Si alloy or in the hard type plated with pure aluminum or aluminum alloy. Material treated in this manner is to be marked Fe-Al pl.

4. Aluminum sheets plated with copper.

Currently, aluminum (Al 99.5) plated on one or both sides with copper is being produced; foundry copper (Cu 99.5) or electrolytic copper (E - Cu) is being used for this process. Material treated in this manner is to be marked Al-Cu pl or Al-ECu pl (for the electrical industry).

Copper-plated aluminum sheets are being used for the manufacture of various instruments, vessels, and containers previously manufactured from copper, and also in the electrical industry, on high-voltage installations, etc. Copper-plated aluminum sheets are being produced in thicknesses from 0.3 to 2.5 millimeters, with maximum dimensions of 250 x 1,000 millimeters. In exceptional cases, sheets that are 300-500 millimeters wide, soft or hard type, are manufactured.

Sheets plated on one side are made with the following compositions: 90:10, 80:20, 70:30, 60:40, and 50:50; those plated on both sides, 5:90:5, 10:80:10, 15:70:15, 20:60:20, and up to 25:50:25. The following table shows the mechanical properties of the soft type:

Plating	Tensile Strength (kg per sq mm)	Elongation (%)	No of Bends (r = 5d)	
80:20	11.5	35	longitudinally	15
			laterally	10
10:80:10	12.7	24	longitudinally	8
			laterally	6

Specific gravity is 3.3-4.5 kilograms per cubic decimeter, depending on the aluminum and copper content.

Tubes

1. Steel tubes with an outside diameter of approximately 35 millimeters, with copper or brass coating on the inside or even on the outside of the tube; thickness of the wall of the coating is 0.2 to 0.5 millimeter, depending on the diameter of the tube.

Coated tubes are produced in either hard or soft types. The tubes are marked Fe plus Cu, Fe plus Ms 63, or, in case of tubes plated on the inside, Fe minus Cu pl. Steel tubes of a quality of corresponding to CSN 1142-1941 are being used for this production. They have the following mechanical properties:

Type	Tensile Strength (kg per sq mm)	Elongation (%)
Soft	32	20
Hard	42	3

2. Seamless steel bushings with an outside diameter of up to 40 millimeters, with a bronze coating of Cu-Sn 6 or Cu-Sn 8 on the inside or outside of the tube, are being produced according to drawings or special specifications for use in bearings which carry an extra heavy load. The fusion between the shell and the inner layer, although mechanical, is perfectly firm, so that independent movement of the parts is possible. A pressure of up to 2,000 kilograms is required, all along the length of the shell, to force the lining out. In order to achieve some savings in nonferrous metals, it is absolutely necessary to make use of standard-size bearings and bushings when ordering; furthermore, bushings will be delivered without tolerances, so that consumers will not need to machine them. Universal ball bearings are also manufactured, but their steel ball race is lined with a leaded-bronze alloy.

Wire

Steel wire with an electrolytic-copper plating, for use as conducting wires for trolleys, telegraph and telephone wire, installation material, etc., is produced in either the soft or hard type.

Wire and other conductors that are drawn or rolled are marked Fe-ECu pl. Normally, the plated layer of copper is approximately 30 percent of the cross section of the wire.

The wire has the following mechanical properties: tensile strength, 60 kilograms per square millimeter; elongation for test piece 200 millimeters long, 2-5 percent; number of bends for wire 3 millimeters in diameter (r = 5 millimeters), 8; maximum over-all resistance for 3-millimeter-diameter wire, 7.5 ohms per kilometer; for 3.40 millimeters diameter, 6.7 ohms per kilometer; for 3.56 millimeters diameter, 5.2 ohms per kilometer; minimum and maximum diameters of plated wire delivered, 0.4 and 4.0 millimeters respectively, unless otherwise specified.

Savings in nonferrous metals of as much as 85 percent may be expected to result from using plated semifinished goods in places where nonferrous metals are not essential.

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